



Designation: F964 – 13 (Reapproved 2024)

Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Exterior Profiles Used for Fencing and Railing¹

This standard is issued under the fixed designation F964; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification establishes requirements for the material properties and physical properties, including dimensional tolerances, extrusion quality, and weatherability, of rigid poly vinyl-chloride (PVC) exterior profiles used for agricultural, commercial, residential fencing and railing. Methods for testing and for identifying exterior profile extrusions that comply with this specification are also provided.

NOTE 1—Information with regard to application, assembly, and installation should be obtained from the manufacturer or in accordance with Practice F1999, or both.

NOTE 2—Loadbearing characteristics for fence and railing assemblies are not addressed within this specification (for example, windload, horizontal or vertical guardrail loading).

1.2 The material used in these exterior profiles is limited to rigid poly (vinyl chloride) (PVC) compounds in a single homogeneous extrusion or in a coextrusion of two or more PVC compounds in distinct layers.

1.3 The values stated in inch-pound units are to be regarded as the standard. The values in parentheses are provided for information only.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

¹ This specification is under the jurisdiction of ASTM Committee F14 on Fences and is the direct responsibility of Subcommittee F14.30 on Rigid Polymer Fence Systems.

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2. Referenced Documents

2.1 ASTM Standards:²

- D618 Practice for Conditioning Plastics for Testing
- D635 Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position
- D696 Test Method for Coefficient of Linear Thermal Expansion of Plastics Between –30°C and +30°C with a Vitreous Silica Dilatometer
- D883 Terminology Relating to Plastics
- D1435 Practice for Outdoor Weathering of Plastics
- D1600 Terminology for Abbreviated Terms Relating to Plastics (Withdrawn 2024)³
- D1898 Practice for Sampling of Plastics (Withdrawn 1998)³
- D2565 Practice for Xenon-Arc Exposure of Plastics Intended for Outdoor Applications
- D4216 Specification for Rigid Poly(Vinyl Chloride) (PVC) and Related PVC and Chlorinated Poly(Vinyl Chloride) (CPVC) Building Products Compounds
- D4226 Test Methods for Impact Resistance of Rigid Poly(Vinyl Chloride) (PVC) Building Products
- D4726 Specification for Rigid Poly(Vinyl Chloride) (PVC) Exterior-Profile Extrusions Used for Assembled Windows and Doors
- F1999 Practice for Installation of Rigid Poly(Vinyl Chloride) (PVC) Fence Systems
- G154 Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Materials

3. Terminology

3.1 *General*—Definitions are in accordance with Terminologies D883 and D1600, unless otherwise indicated.

3.2 *Definitions of Terms Specific to This Standard:*

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at www.astm.org/contact. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ The last approved version of this historical standard is referenced on www.astm.org.



3.2.1 *capstock*—the outer layer in a coextrusion exposed to weathering.

3.2.2 *coextrusion*—the process of coextruding profiles from two or more concentric streams of PVC compounds.

NOTE 3—Separate PVC materials may be coextruded to form a multi-layered profile with each layer having different physical characteristics such as strength and weathering.

3.2.3 *color-hold guidelines*—predictive target color regions within a three-dimensional model which constitute acceptable appearance retention levels of color change resulting from weathering of specific product type and color.

NOTE 4—Commercial products which demonstrate weathering behavior within reasonable conformance to these target guidelines during a 2-year test period can be anticipated to weather without exhibiting unacceptable color changes during the service life of the product.

3.2.4 *longitudinal bow*—refers to bow along the span. Longitude is measured along the span.

3.2.5 *reworked material*—material from the manufacturer's facility of known, compatible composition meeting the material requirement of this specification that has been reground, pelletized, or solvated after having been previously processed by molding, extrusion, and so forth.

3.2.6 *single layer profile*—profiles extruded from a single PVC compound. Weathering and other physical characteristics are uniform throughout the profile.

3.2.7 *substrate*—inner layer(s) of a coextrusion not exposed to weathering.

3.2.8 *temperate northern climate*—in weather testing, a North American metropolitan area testing site located within 73 to 100° W longitude and 37 to 45° N latitude.

4. Significance and Use

4.1 The purpose of this specification is to establish a recognized standard of quality for rigid poly vinyl chloride (PVC) exterior profiles for use in assembling agricultural, commercial, and residential fencing and railing. The term "PVC fence" refers to complete fencing and railings systems in which the primary structural members such as posts, rails, spindles, pickets, and gates are made from PVC exterior profiles. Accessory components (not included in this specification), including bolts, screws, hinges, latches, caps, and brackets, may be made from PVC or non-PVC materials, or both. The information contained in this specification is intended to be helpful to producers, distributors, and users and to promote understanding between purchasers and sellers.

5. Materials and Manufacture

5.1 The rigid poly vinyl chloride (PVC) compound for exterior-profile extrusions meeting the requirements of this specification are categorized by the cell class requirements in accordance with Specification D4216.

5.2 The PVC compounds used for the products meeting this specification shall meet a minimum cell class of 1-20233-23 for PVC profiles and 3-20233-23 for PVC substrate with alternate capstock materials as defined in Specification D4216.

Compounds that have higher cell classification because one or more properties are superior to those in the specified compound are acceptable.

5.3 *Color*—The color of the profiles shall be as agreed upon between the purchaser and the seller. The color specified shall be uniform throughout a single material extrusion or throughout the capstock layer of a coextruded profile for profiles intended to be of uniform color.

5.4 The extruded profiles shall be free from visible cracks, voids, or foreign inclusions.

5.5 The PVC compound, when tested in accordance with Test Method D635, shall not exceed an average extent of burn of 4 in. (100 mm), with an average time of burn not to exceed 10 s. A sample thickness of 0.090 ± 0.009 in. (2.3 ± 0.2 mm) shall be used.

NOTE 5—The flammability testing data, conclusions, and recommendations of Test Method D635 relate solely to the measurement and description of the properties of materials, products, or systems in response to heat and flame under controlled laboratory conditions and should not be used for the description or appraisal of the fire hazard of materials, products, or systems under actual fire conditions.

NOTE 6—No recycled (post consumer waste) may be used in the production of fence profiles.

5.6 *Reworked Material*—Clean reworked material may be used, provided that the fence profiles produced in whole or in part from the reworked materials meet all of the requirements of this specification.

5.7 The PVC compound in extruded section shall maintain uniform color and be free of any visual surface or structural changes, such as peeling, chipping, cracking, flaking, or pitting after weathering for six months and one year for white and for six months, one year, and two years for all other colors in hot, dry climate such as Phoenix, AZ; a hot humid climate, such as Miami, FL; and a temperate northern climate, when tested in accordance with 7.1.1 – 7.1.4.

5.8 The PVC compound shall have a minimum impact resistance of 0.6 in.-lb/mil (2670 J/m) after weathering six months and one year in a hot, dry climate such as Phoenix, AZ; a hot, humid climate, such as Miami, FL; and a temperate northern climate, when tested in accordance with 7.1.1 – 7.1.4.

5.9 The PVC compound shall have successfully met the weathering requirements prescribed in 5.7 and 5.8 for six months at each climatic testing site prior to use in production of exterior-profile extrusions, when tested in accordance with 7.1.1 – 7.1.4.

NOTE 7—The six-month test requirement constitutes a screening process to eliminate catastrophic failure.

6. Physical Requirements

6.1 *Length, Height, and Width*—The specified length, height, and width of the fencing profiles shall be as agreed upon between the purchaser and the seller, or by established internal process control standards. The actual length shall be within $\pm 1/4$ in. (6.4 mm) of the specified length and the actual height and width shall be within $1/16$ in. (1.6 mm) of the specified height and width when measured in accordance with 8.4 and 8.5.

X2. SUGGESTED MANUFACTURER'S QUALITY ASSURANCE PROGRAM

X2.1 Each manufacturer should establish a formal and written procedure for an ongoing quality assurance program. Records of quality assurance tests should be retained for a minimum of two to five years for the benefit of both the customer and the manufacturer.

X2.2 *In-plant Test Frequencies*—Certain tests described in this specification should be done on a qualification basis while others should be performed on a daily basis:

X2.2.1 Cell classification tests should be performed at the initiation of production of extruded profiles, when any changes are made in the formulations of the PVC materials, when compounding equipment is replaced or modified, or at least once annually for each material or coextruded materials.

X2.2.2 Coefficient of expansion tests should be performed at the initiation of production of profiles, at the initiation of a

new compound, or when significant changes in filler levels are made in a compound.

X2.2.3 Dimensional tests should be made at the startup of a production run and every 2 h thereafter.

X2.2.4 Flattening, extrusion quality, impact resistance, warp, color comparison with standard color samples, capstock thickness, and bond testing should be done at the startup of a production and once per shift thereafter with a minimum of two tests per 24 h of production.

X2.2.5 Artificial weathering tests should be performed for any new compound or when formulation changes are made in existing compounds. Production from a new or modified compound should be withheld until the samples have successfully passed 30 days of artificial weathering in accordance with **X1.3**.

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